

COMMISSIONS 27 AND 42 OF THE IAU
INFORMATION BULLETIN ON VARIABLE STARS

Number 0000

Konkoly Observatory
Budapest
16 September 2011
HU ISSN 0374 – 0676

V1162 ORION: UPDATED AMPLITUDE AND PERIOD VARIATION

KHOKHUNTOD, PONGSAK^{1,2}; ZHOU, AI-YING^{3*}; BOONYARAK, CHAYAN¹; JIANG, SHI-YANG^{1,3}

¹ Department of Physics, Faculty of Science, Naresuan University, Phitsanulok 65000, Thailand

² Department of Astronomy, Beijing Normal University, China

³ National Astronomical Observatory of China, Chinese Academy of Sciences, Datun Road 20A, Beijing, 100086, China; *Correspondent author, E-mail: aiying@nao.cas.cn

V1162 Orion is an intermediate-amplitude δ Scuti type variable. Its variability was first discovered by Lampens (1985), who derived a period of 0.078686(2) days with a full amplitude of about 0.18 mag in V band. Hintz et al. (1998) observed this star and found its amplitude in V had dropped to about 0.10 mag. Arentoft & Sterken (2000) and Arentoft et al. (2001a, 2001b) got the same amplitude of ~ 0.10 mag in V .

We had observed this star from 2007 January to 2010 February using several telescopes at Naresuan University, Thailand and at Yunnan Observatory and the Xinglong Station of National Astronomical Observatories, China (NAOC). We determined a sum of 39 new times of maximum light (refers to Table 1), following the method described by Zhou & Liu (2003). Errors involved in the maximum determination are around 0.00045 d or less. In this note, we present a two-night sample of the newly observed light curves along with an updated $O - C$ diagram. Figure 1 shows the light curve of V1162 Ori on 2010 November 24 and 25 from the 60-cm telescope of NAOC. We can see clearly that the peak-to-peak full amplitude in V recovered to about 0.18 mag. This conforms with the amplitude variability declared in the literature. The differential photometric light curve data are available upon request from the authors.

We have noted that Arentoft et al. (2001a) presented the results of multisite observations contributed by 18 telescopes from 15 observatories around the global. They measured 253 light extrema (145 maxima and 108 minima) during the observing season from 1999 October to 2000 May. They got an overall tendency of period decreasing with a very high rate of $\frac{dP}{dt} = -5 \times 10^{-9} \text{ s s}^{-1}$ (equivalent to $\frac{1}{P} \frac{dP}{dt} = -2.4 \times 10^{-5} \text{ yr}^{-1}$). Moreover, the $(O - C)$ residuals seemed to follow a cyclic variation with a period of $285 \pm 3 \text{ d}$, which is on a time-scale similar to that of the amplitude variations ($282 \pm 6 \text{ d}$). In addition, we found 40 maxima in Wils et al. (2010, 2011), we draw here a $(O - C)$ diagram based on a total of 385 times of maximum light.

To calculate $(O - C)$ residuals and their corresponding cycles (denoted by E below) elapsed since an initial maximum epoch, we have defined a new ephemeris

$$T_{\max} = \text{HJD } 2451890.3708 + 0.0786869 \times E. \quad (1)$$

according to Arentoft & Sterken (2002). The cycle counts are usually the results rounded off by rounding a numerical value to the nearest integer. For those cases when a value

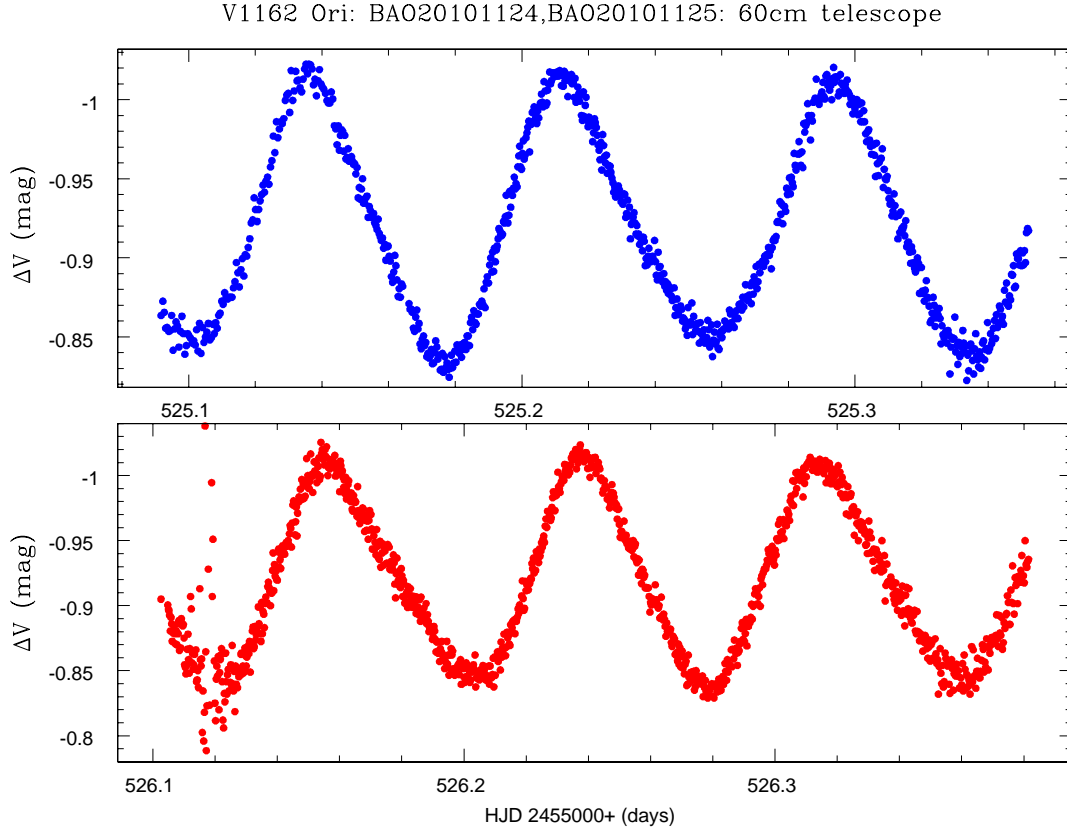


Figure 1: The light curves of V1162 Ori obtained on 2010 Nov. 24 and 25.

Table 1: The new times of maximum light of V1162 Ori obtained in 2007–2011.

No.	HJD(max)	No.	HJD(max)	No.	HJD(max)
1	2454130.0693	14	2454178.0626	27	2455525.13603
2	2454131.0901	15	2454181.0580	28	2455525.21233
3	2454131.1701	16	2454184.0422	29	2455525.29404
4	2454132.1171	17	2454847.0331	30	2455526.15567
5	2454132.1882	18	2454847.1111	31	2455526.23844
6	2454133.0578	19	2454847.1889	32	2455526.31468
7	2454133.1367	20	2454871.1100	33	2455565.10686
8	2454133.2158	21	2454871.1910	34	2455565.18583
9	2454137.0715	22	2455249.1147	35	2455565.26503
10	2454137.1467	23	2455250.0539	36	2455602.08888
11	2454161.0694	24	2455250.1342	37	2455602.16764
12	2454164.0582	25	2455524.19384	38	2455610.03529
13	2454176.0189	26	2455524.26824	39	2455610.11388

is exactly half-way between two integers, it is always rounded up following the so-called ‘round half up’ tie-breaking rule. For example, the values (66.51, 23.5, −23.5, 15.49, −18.38, −18.67), get rounded to (67, 24, −23, 15, −18, −19), respectively. This rounding policy results in $(O - C)$ residuals within half a period, i.e. $|O - C| \leq 0.0393$ days. The resultant $O - C$ diagram was drawn in Fig. 2, which cannot be fitted by either a single

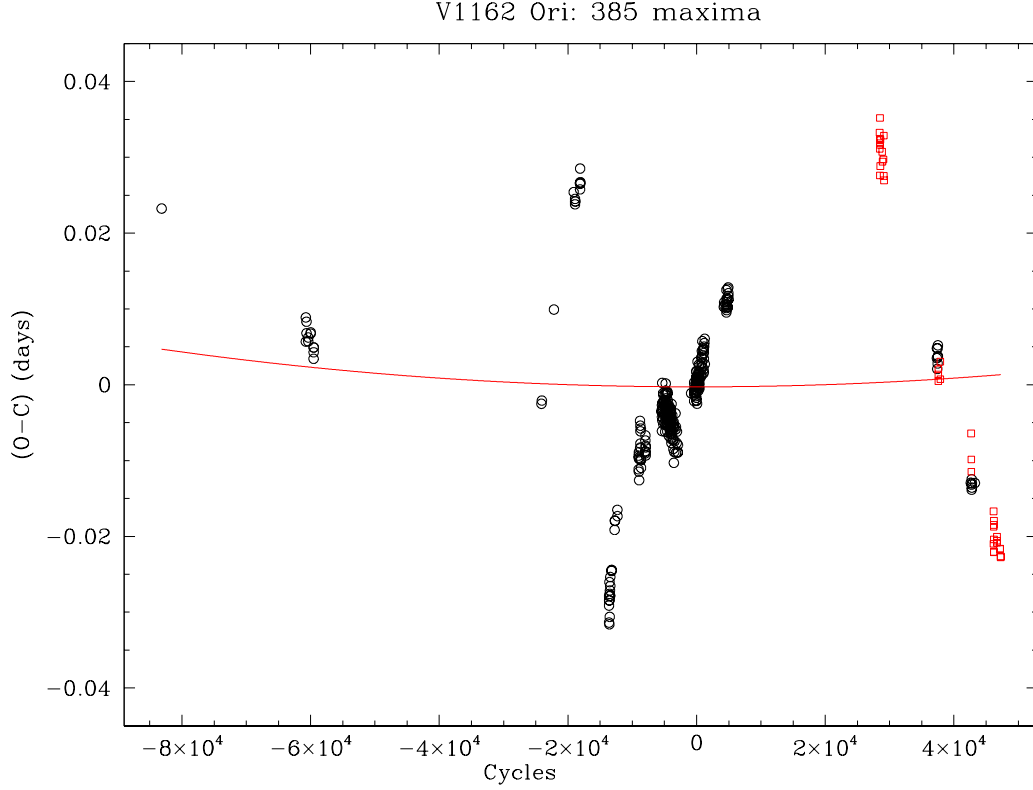


Figure 2: The $O - C$ diagram of V1162 Ori: the forced parabolic fitting curve is not justified. The new maxima in Table 1 are drawn in squares.

linear line or a simple parabolic curve. Part of the 385 maxima and $(O - C)$ data are shown in Table 2. The full list is available upon request from the authors.

Table 2: List of 385 light maxima of V1162 Ori and their $(O - C)$ residuals computed by Eq.(1). The reference 'L' refers to Lampens(1985), 'A' refers to Arentoft et al.(2000,2001a,2001b,2002), 'H' stands for Hintz et al.(1998), 'P' for Poretti et al.(1990), 'W' for Wils et al.(2010,2011), while 'J' for this work.

No.	Maximum	Fractional Cycles	Cycles	$(O - C)$	Ref.
1	2445347.02750	-83156.70	-83157	0.023243	L
2	2447110.78000	-60741.88	-60742	0.008880	P
3	2447110.85550	-60740.92	-60741	0.005693	P
.....					
247	2451890.37080	0.00	0	0.000000	A
248	2451890.45000	1.00	1	0.000513	A
.....					
346	2455293.33020	43246.83	43247	-0.012964	W
347	2454130.06930	28463.42	28463	0.033265	J
.....					
384	2455610.03529	47271.71	47272	-0.022647	J
385	2455610.11388	47272.71	47273	-0.022744	J

References:

- Arentoft, T., Sterken, C., 2000, *A&A*, **354**, 589
Arentoft, T., et al., 2001a, *A&A*, **374**, 1056
Arentoft, T., et al., 2001b, *A&A*, **378**, L33
Arentoft, T., Sterken, C., 2002, *ASP Conf. Ser.*, **256**, 79, in Observational Aspects of Pulsating B- & A Stars.,
Hintz, E. G., Joner, M. D., Kim, C., 1998, *PASP*, **110**, 689
Lampens, P., 1985, *IBVS*, 2794
Wils, P., Hambsch, F. J., Lampens, P., et al., 2010, *IBVS*, 5928
Wils, P., Hambsch, F. J., Robertson, C. W., et al., 2011, *IBVS*, 5977
Zhou, A.-Y., Liu, Z.-L., 2003, *AJ*, **126**, 2462